

#6att



SEQUENCE LISTING

<110> Novak, Rodger  
Toumanen, Elaine

<120> NOVEL ANTIBIOTICS AND METHODS OF USING THE SAME

<130> 1340-1-016N

<140> 09/305,984

<141> 1999-05-05

<150> 60/084,399

<151> 1998-05-06

<160> 54

<170> PatentIn Ver. 2.0

<210> 1

<211> 75

<212> DNA

<213> Streptococcus pneumoniae

<400> 1

atgagaaagg aatttcacaa cgttttatct agtggtcagt tgcttgaga caaaaggcca 60  
gcaagagact ataata 75

<210> 2

<211> 25

<212> PRT

<213> Streptococcus pneumoniae

<400> 2

Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu Leu Ala  
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Tyr Asn  
20 25

<210> 3

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Encodes

modified Streptococcus Pneumonia peptide

<400> 3  
atgagaaagg aatttcacaa cgttttatct gctggtcagt tgcttcaga caaaaggcca 60  
gcaagagact ataat 75

<210> 4  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Modified  
Streptococcus Pneumonia peptide

<400> 4  
Met Lys Arg Glu Phe His Asn Val Leu Ser Ala Gly Gln Leu Leu Ala  
1 5 10 15  
Asp Lys Arg Pro Ala Arg Asp Tyr Asn  
20 25

<210> 5  
<211> 75  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Encodes  
modified Streptococcus Pneumonia peptide

<400> 5  
atgagaaagg aatttcacaa cgttttatct agtggtcagt tgcttcaga caaaaggcca 60  
gcaagagacg ctaat 75

<210> 6  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Modified  
Streptococcus Pneumonia peptide

<400> 6  
Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu Leu Ala  
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Ala Asn  
20 25

<210> 7  
<211> 42  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 7  
atgagaaagg aatttcacaa cgttttatct agtggtcagt tg 42

<210> 8  
<211> 14  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 8  
Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu  
1 5 10

<210> 9  
<211> 33  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 9  
cttgagaca aaaggccagc aagagactat aat 33

<210> 10  
<211> 11  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 10  
Leu Ala Asp Lys Arg Pro Ala Arg Asp Tyr Asn  
1 5 10

<210> 11  
<211> 84  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 11  
atggaattta tgagaaagga atttcacaac gttttatcta gtggtcagtt gcttgagac 60

aaaaggccag caagagacta taat

84

<210> 12

<211> 28

<212> PRT

<213> Streptococcus pneumoniae

<400> 12

Met Glu Phe Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln

1

5

10

15

Leu Leu Ala Asp Lys Arg Pro Ala Arg Asp Tyr Asn

20

25

<210> 13

<211> 1329

<212> DNA

<213> Streptococcus pneumoniae

<400> 13

atgaaacgaa cagggtttatt tgcaaagata tttatctata ctttctcgat atttagtggt 60  
ctgggttatct gccttcattt agctatattt tttctttttc cttcgactta tctgagtcac 120  
cgtcaggaaa ccattgggtca aaaggcaaca gccattgccc agtccctaga agggaaagat 180  
aggcagagta tcgagcaagt gttagacttg tattcccaga ctagtgatat caaggggacc 240  
gtcaaagggtg agatgaccga ggacaagtta gaagtcaagg acagtcttcc tctggacaca 300  
gaccgccaga caacctctct ctttattgag gagcgcgagg tgaaaacgca agacggtggt 360  
actatgattc tccagtttct agcttccatg gattttacaaa aggaagcgga gcaaatacagt 420  
ctccagtttc ttccctatac cttgctggcc tcctttctga tttccctttt ggtggcctac 480  
atctacgctc ggactattgt tgcaccgatt ttggaaatca agcgggtgac ccgtcggatg 540  
atggacctgg attcccaagt gcgattgcgc gtggattcta aggatgagat aggtaatatc 600  
aaggaacaaa tcaatagcct ctaccagcat ctcttgactg ttattgcgga cttgcatgaa 660  
aagaatgaag ccattctcca gctggagaag atgaaggtcg aattcctacg aggagcttct 720  
catgaattga aaacaccgct ggctagtttg aaaatcctaa tcgaaaatat gagagagaat 780  
atcggtcggt ataaggatag agaccagtat ctgggagttg ccttggggat tgtggatgaa 840  
ctcaatcacc atgttctgca gatactttcc ctctcttctg tgcaggaatt gcgagatgat 900  
agggaaacaa ttgacctcct ccagatgacg caaaatctgg tcaaagatta tgccttgcta 960  
gccaaggaaa gagagctcca gatagacaat agtttgaccc atcagcaggc ttatctaaac 1020  
ccatcagtta tgaagttgat tctttctaata ctcatcagca atgccattaa gcactctggt 1080  
ccagggtggct tagttcgaat tggagaaaga gaaggagaac tttttatcga aaatagctgt 1140  
agctcagagg aacaagaaaa actagcccag tctttttctg acaatgccag tcgcaaggtc 1200  
aaggggtctg gtatggggct ctttgtgggt aagagtctat tagaacatga aaaattagct 1260  
tatcgtttct agatggagga gaatagttta accttcttta tagattttcc aaaagtcgtc 1320  
caagactag 1329

<210> 14

<211> 442

<212> PRT

<213> Streptococcus pneumoniae

<400> 14

Met	Lys	Arg	Thr	Gly	Leu	Phe	Ala	Lys	Ile	Phe	Ile	Tyr	Thr	Phe	Ser
1				5					10					15	
Ile	Phe	Ser	Val	Leu	Val	Ile	Cys	Leu	His	Leu	Ala	Ile	Tyr	Phe	Leu
			20					25					30		
Phe	Pro	Ser	Thr	Tyr	Leu	Ser	His	Arg	Gln	Glu	Thr	Ile	Gly	Gln	Lys
		35					40					45			
Ala	Thr	Ala	Ile	Ala	Gln	Ser	Leu	Glu	Gly	Lys	Asp	Arg	Gln	Ser	Ile
	50					55					60				
Glu	Gln	Val	Leu	Asp	Leu	Tyr	Ser	Gln	Thr	Ser	Asp	Ile	Lys	Gly	Thr
65					70					75					80
Val	Lys	Gly	Glu	Met	Thr	Glu	Asp	Lys	Leu	Glu	Val	Lys	Asp	Ser	Leu
				85					90					95	
Pro	Leu	Asp	Thr	Asp	Arg	Gln	Thr	Thr	Ser	Leu	Phe	Ile	Glu	Glu	Arg
			100					105					110		
Glu	Val	Lys	Thr	Gln	Asp	Gly	Gly	Thr	Met	Ile	Leu	Gln	Phe	Leu	Ala
		115					120					125			
Ser	Met	Asp	Leu	Gln	Lys	Glu	Ala	Glu	Gln	Ile	Ser	Leu	Gln	Phe	Leu
	130						135				140				
Pro	Tyr	Thr	Leu	Leu	Ala	Ser	Phe	Leu	Ile	Ser	Leu	Leu	Val	Ala	Tyr
145					150					155					160
Ile	Tyr	Ala	Arg	Thr	Ile	Val	Ala	Pro	Ile	Leu	Glu	Ile	Lys	Arg	Val
				165					170					175	
Thr	Arg	Arg	Met	Met	Asp	Leu	Asp	Ser	Gln	Val	Arg	Leu	Arg	Val	Asp
			180					185					190		
Ser	Lys	Asp	Glu	Ile	Gly	Asn	Leu	Lys	Glu	Gln	Ile	Asn	Ser	Leu	Tyr
		195					200					205			
Gln	His	Leu	Leu	Thr	Val	Ile	Ala	Asp	Leu	His	Glu	Lys	Asn	Glu	Ala
	210						215				220				
Ile	Leu	Gln	Leu	Glu	Lys	Met	Lys	Val	Glu	Phe	Leu	Arg	Gly	Ala	Ser
225					230					235					240

His Glu Leu Lys Thr Pro Leu Ala Ser Leu Lys Ile Leu Ile Glu Asn  
245 250 255

Met Arg Glu Asn Ile Gly Arg Tyr Lys Asp Arg Asp Gln Tyr Leu Gly  
260 265 270

Val Ala Leu Gly Ile Val Asp Glu Leu Asn His His Val Leu Gln Ile  
275 280 285

Leu Ser Leu Ser Ser Val Gln Glu Leu Arg Asp Asp Arg Glu Thr Ile  
290 295 300

Asp Leu Leu Gln Met Thr Gln Asn Leu Val Lys Asp Tyr Ala Leu Leu  
305 310 315 320

Ala Lys Glu Arg Glu Leu Gln Ile Asp Asn Ser Leu Thr His Gln Gln  
325 330 335

Ala Tyr Leu Asn Pro Ser Val Met Lys Leu Ile Leu Ser Asn Leu Ile  
340 345 350

Ser Asn Ala Ile Lys His Ser Val Pro Gly Gly Leu Val Arg Ile Gly  
355 360 365

Glu Arg Glu Gly Glu Leu Phe Ile Glu Asn Ser Cys Ser Ser Glu Glu  
370 375 380

Gln Glu Lys Leu Ala Gln Ser Phe Ser Asp Asn Ala Ser Arg Lys Val  
385 390 395 400

Lys Gly Ser Gly Met Gly Leu Phe Val Val Lys Ser Leu Leu Glu His  
405 410 415

Glu Lys Leu Ala Tyr Arg Phe Glu Met Glu Glu Asn Ser Leu Thr Phe  
420 425 430

Phe Ile Asp Phe Pro Lys Val Val Gln Asp  
435 440

<210> 15

<211> 657

<212> DNA

<213> Streptococcus pneumoniae

<400> 15

atgaaaattt taattgtaga agatgaagag atgatccgtg aggggggtcag tgattatttg 60  
acggattgtg gctatgaaac tattgaggca gcggacggtc aggaagctct ggagcaattt 120

tctagctatg aggtggccct ggttttactg gatattccaga tgcccaagct caacggctta 180  
gaagtcctag ctgagattcg taaaaccagt caggttcctg tcttgatgtt gacagctttt 240  
caagatgagg aatacaagat gagtgccttt gcctctttgg cagatggcta tctggaaaaa 300  
cctttctccc tctccctttt aaaagtgagg gtggacgcga ttttcaagcg ctactacgat 360  
acaggacgaa tcttttctta caaggatacc aaggtggact ttgaaagcta cagtgcgaagc 420  
ctcgcaggtc aagaagtgcc tatcaatgcc aaagagttgg aaattctgga ctatctagtg 480  
aaaaatgaag gccgggcctt gactcgatct cagattatcg atgccgtctg gaaagcgaca 540  
gatgagggtc cctttgaccg tgttattgat gtttatatca aggaattgcg gaaaaagcta 600  
gacttggatt gtatcctcac tgtgcgcaat gttggttata aattggagcg aaaatga 657

<210> 16

<211> 218

<212> PRT

<213> Streptococcus pneumoniae

<400> 16

Met Lys Ile Leu Ile Val Glu Asp Glu Glu Met Ile Arg Glu Gly Val  
1 5 10 15

Ser Asp Tyr Leu Thr Asp Cys Gly Tyr Glu Thr Ile Glu Ala Ala Asp  
20 25 30

Gly Gln Glu Ala Leu Glu Gln Phe Ser Ser Tyr Glu Val Ala Leu Val  
35 40 45

Leu Leu Asp Ile Gln Met Pro Lys Leu Asn Gly Leu Glu Val Leu Ala  
50 55 60

Glu Ile Arg Lys Thr Ser Gln Val Pro Val Leu Met Leu Thr Ala Phe  
65 70 75 80

Gln Asp Glu Glu Tyr Lys Met Ser Ala Phe Ala Ser Leu Ala Asp Gly  
85 90 95

Tyr Leu Glu Lys Pro Phe Ser Leu Ser Leu Leu Lys Val Arg Val Asp  
100 105 110

Ala Ile Phe Lys Arg Tyr Tyr Asp Thr Gly Arg Ile Phe Ser Tyr Lys  
115 120 125

Asp Thr Lys Val Asp Phe Glu Ser Tyr Ser Ala Ser Leu Ala Gly Gln  
130 135 140

Glu Val Pro Ile Asn Ala Lys Glu Leu Glu Ile Leu Asp Tyr Leu Val  
145 150 155 160

Lys Asn Glu Gly Arg Ala Leu Thr Arg Ser Gln Ile Ile Asp Ala Val  
165 170 175

Trp Lys Ala Thr Asp Glu Val Pro Phe Asp Arg Val Ile Asp Val Tyr  
180 185 190

Ile Lys Glu Leu Arg Lys Lys Leu Asp Leu Asp Cys Ile Leu Thr Val  
195 200 205

Arg Asn Val Gly Tyr Lys Leu Glu Arg Lys  
210 215

<210> 17

<211> 648

<212> DNA

<213> Streptococcus pneumoniae

<400> 17

```
atgactttat tacaattaca agatgttacc taccgttata agaatactgc tgaagcagtc 60
ctatatcaga tcaattataa ttttgaaccc ggaaaatttt acagtattat tggggagtc 120
ggagcaggaa aatccacact cttgtcccta cttgctggtc tagatagtc tgttgaaggt 180
tctatccttt ttcaaggaga ggatattcgt aagaagggt attcttacca tcgcatgcac 240
catatttccc tgggtctttca aaattataac ttgatagatt atctttctcc gctggaaaat 300
atccgattgg tcaacaaaaa ggcaagcaag aatacacttc ttgagcttgg tttggatgaa 360
agccagatca agcggaatgt tctccagtta tcaggtggtc aacagcaacg tgttgccatt 420
gctcgagtt tgggtctcaga agctccagtt attctagctg atgagccaac aggaaatctg 480
gatacctaaa ctgctggaga tattgtcgaa ctactcaaat cacttgccca gaaaacaggt 540
aaatgtgtga ttgtcgtaac tcacagtaaa gaagtggcac aagcgtcaga tattacactt 600
gaattaaagg ataagaaact gactgaaacg cgcaatacta gtaaataa 648
```

<210> 18

<211> 215

<212> PRT

<213> Streptococcus pneumoniae

<400> 18

Met Thr Leu Leu Gln Leu Gln Asp Val Thr Tyr Arg Tyr Lys Asn Thr  
1 5 10 15

Ala Glu Ala Val Leu Tyr Gln Ile Asn Tyr Asn Phe Glu Pro Gly Lys  
20 25 30

Phe Tyr Ser Ile Ile Gly Glu Ser Gly Ala Gly Lys Ser Thr Leu Leu  
35 40 45

Ser Leu Leu Ala Gly Leu Asp Ser Pro Val Glu Gly Ser Ile Leu Phe  
50 55 60

Gln Gly Glu Asp Ile Arg Lys Lys Gly Tyr Ser Tyr His Arg Met His



65		70		75		80
His Ile Ser Leu Val Phe Gln Asn Tyr Asn Leu Ile Asp Tyr Leu Ser						
	85		90		95	
Pro Leu Glu Asn Ile Arg Leu Val Asn Lys Lys Ala Ser Lys Asn Thr						
	100		105		110	
Leu Leu Glu Leu Gly Leu Asp Glu Ser Gln Ile Lys Arg Asn Val Leu						
	115		120		125	
Gln Leu Ser Gly Gly Gln Gln Gln Arg Val Ala Ile Ala Arg Ser Leu						
	130		135		140	
Val Ser Glu Ala Pro Val Ile Leu Ala Asp Glu Pro Thr Gly Asn Leu						
145		150		155		160
Asp Pro Lys Thr Ala Gly Asp Ile Val Glu Leu Leu Lys Ser Leu Ala						
	165		170		175	
Gln Lys Thr Gly Lys Cys Val Ile Val Val Thr His Ser Lys Glu Val						
	180		185		190	
Ala Gln Ala Ser Asp Ile Thr Leu Glu Leu Lys Asp Lys Lys Leu Thr						
	195		200		205	
Glu Thr Arg Asn Thr Ser Lys						
210		215				

<210> 19  
 <211> 1380  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 19  
 atgttacaca acgcatttgc ctatgtttaca aggaagtgtt tcaaatacgat tgtcatcttc 60  
 ctgattattc tcctcatggc gagcttgagt ttggtcggct tgtcaatcaa gggagctact 120  
 gccaaaggctt ctcaggagac ctttaaaaat atcaccaata gcttctccat gcaaatacaat 180  
 cgtcgcgtca accaaggaac gcctcgtggt gctgggaata tcaagggtga agacatcaaa 240  
 aaaatcaccg aaaacaaggc cattgagtct tatgtcaaac gtatcaacgc tatcggagat 300  
 ttgactggat atgacctgat tgaaacgcca gaaaccaaga agaatctcac tgctgatcgt 360  
 gccaaagcgtt ttggaagtag cttgatgatt acagggtgtca atgactcctc taaagaagac 420  
 aagtttgtct ctggttctta taaactagtc gaaggagagc acttaaccaa cgacgacaag 480  
 gataaaatcc tcttgacaaa ggacttggca gccaaacacg gctggaaagt aggggacaag 540  
 gttaaactgg actctaatat ctacgatgca gataatgaaa aaggagccaa ggaaacagtt 600  
 gaagtgacaa tcaagggact ctttgatggt cataataagt cagcagtaac ctactcacia 660  
 gaactttacg aaaacacagc tattacagac attcacactg ctgcaaaact ttatggatac 720

acagaagaca cagccattta tggggaacga accttctttg taacagcaga caagaacttg 780  
gatgatgtta tgaagaggtt gaatggcatc agtggatatca actggaagag ctacacactc 840  
gtcaagagct cctctaacta cccagctctt gagcaatcta tctctgggat gtacaagatg 900  
gccaacctcc tcttctgggg tagcttgagc ttctcagttc tcctccttgc cctcttgctc 960  
agcctttgga tcaacgcccg tcgcaaggaa gtgggaattc tcctctctat cggcctcaag 1020  
caggcaagta tcttgggtca attcatcacc gaatctatct tgattgctat ccctgctcta 1080  
gtttctgctt acttcctagc taattacact gcccgtgcaa ttggaaacac tgtccttgcc 1140  
aatgtgactt caggtgttgc caaacaggct agtaaggcgg ctcaagcctc taaccttggg 1200  
gggtggtgcag aagtagatgg ctttagcaag accttgtcga gcctagacat ttccattcag 1260  
acatcagact ttatcatcat ttttgtcctt gccttggttc tagtggttct cgttatggcg 1320  
cttgcttcaa gcaatctcct tagaaaacaa ccaaaagagc tcttgctgga tgggtaataa 1380

<210> 20

<211> 459

<212> PRT

<213> Streptococcus pneumoniae

<400> 20

Met Leu His Asn Ala Phe Ala Tyr Val Thr Arg Lys Phe Phe Lys Ser  
1 5 10 15

Ile Val Ile Phe Leu Ile Ile Leu Leu Met Ala Ser Leu Ser Leu Val  
20 25 30

Gly Leu Ser Ile Lys Gly Ala Thr Ala Lys Ala Ser Gln Glu Thr Phe  
35 40 45

Lys Asn Ile Thr Asn Ser Phe Ser Met Gln Ile Asn Arg Arg Val Asn  
50 55 60

Gln Gly Thr Pro Arg Gly Ala Gly Asn Ile Lys Gly Glu Asp Ile Lys  
65 70 75 80

Lys Ile Thr Glu Asn Lys Ala Ile Glu Ser Tyr Val Lys Arg Ile Asn  
85 90 95

Ala Ile Gly Asp Leu Thr Gly Tyr Asp Leu Ile Glu Thr Pro Glu Thr  
100 105 110

Lys Lys Asn Leu Thr Ala Asp Arg Ala Lys Arg Phe Gly Ser Ser Leu  
115 120 125

Met Ile Thr Gly Val Asn Asp Ser Ser Lys Glu Asp Lys Phe Val Ser  
130 135 140

Gly Ser Tyr Lys Leu Val Glu Gly Glu His Leu Thr Asn Asp Asp Lys  
145 150 155 160

Asp	Lys	Ile	Leu	Leu	His	Lys	Asp	Leu	Ala	Ala	Lys	His	Gly	Trp	Lys	
				165					170					175		
Val	Gly	Asp	Lys	Val	Lys	Leu	Asp	Ser	Asn	Ile	Tyr	Asp	Ala	Asp	Asn	
			180					185					190			
Glu	Lys	Gly	Ala	Lys	Glu	Thr	Val	Glu	Val	Thr	Ile	Lys	Gly	Leu	Phe	
		195					200					205				
Asp	Gly	His	Asn	Lys	Ser	Ala	Val	Thr	Tyr	Ser	Gln	Glu	Leu	Tyr	Glu	
	210					215					220					
Asn	Thr	Ala	Ile	Thr	Asp	Ile	His	Thr	Ala	Ala	Lys	Leu	Tyr	Gly	Tyr	
225					230					235					240	
Thr	Glu	Asp	Thr	Ala	Ile	Tyr	Gly	Asp	Ala	Thr	Phe	Phe	Val	Thr	Ala	
				245					250					255		
Asp	Lys	Asn	Leu	Asp	Asp	Val	Met	Lys	Glu	Leu	Asn	Gly	Ile	Ser	Gly	
			260					265					270			
Ile	Asn	Trp	Lys	Ser	Tyr	Thr	Leu	Val	Lys	Ser	Ser	Ser	Asn	Tyr	Pro	
		275					280					285				
Ala	Leu	Glu	Gln	Ser	Ile	Ser	Gly	Met	Tyr	Lys	Met	Ala	Asn	Leu	Leu	
	290					295					300					
Phe	Trp	Gly	Ser	Leu	Ser	Phe	Ser	Val	Leu	Leu	Leu	Ala	Leu	Leu	Leu	
305				310					315						320	
Ser	Leu	Trp	Ile	Asn	Ala	Arg	Arg	Lys	Glu	Val	Gly	Ile	Leu	Leu	Ser	
				325					330					335		
Ile	Gly	Leu	Lys	Gln	Ala	Ser	Ile	Leu	Gly	Gln	Phe	Ile	Thr	Glu	Ser	
		340						345					350			
Ile	Leu	Ile	Ala	Ile	Pro	Ala	Leu	Val	Ser	Ala	Tyr	Phe	Leu	Ala	Asn	
		355					360					365				
Tyr	Thr	Ala	Arg	Ala	Ile	Gly	Asn	Thr	Val	Leu	Ala	Asn	Val	Thr	Ser	
	370					375					380					
Gly	Val	Ala	Lys	Gln	Ala	Ser	Lys	Ala	Ala	Gln	Ala	Ser	Asn	Leu	Gly	
385					390					395					400	
Gly	Gly	Ala	Glu	Val	Asp	Gly	Phe	Ser	Lys	Thr	Leu	Ser	Ser	Leu	Asp	
				405					410					415		

Ile Ser Ile Gln Thr Ser Asp Phe Ile Ile Ile Phe Val Leu Ala Leu  
420 425 430

Val Leu Val Val Leu Val Met Ala Leu Ala Ser Ser Asn Leu Leu Arg  
435 440 445

Lys Gln Pro Lys Glu Leu Leu Leu Asp Gly Glu  
450 455

<210> 21  
<211> 1278  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 21  
atgaatccaa tccaaagatc ttgggcttat gtcagcagaa agcgactgag aagtttttatt 60  
ttattttctga ttttattgggt cttatttgcc ggaatttcag cctgtttgac tctgatgaag 120  
tccaaacaaaa cagtagaaaag caatctttat aaatcactca atacatcttt ttctattaag 180  
aagatagaga atgggtcagac attcaagttg tcagacctag catctgtaag caagattaag 240  
gggctggaaa atgtctctcc tgaacttgag acggctcgaa aactaaaaga caaggaagca 300  
gtgactggcg agcagagcgt ggagcgtgat gatattatcag ctgcagacaa taacttgggt 360  
agcttaacgg ctcttgagga ttcatccaag gatgtaacct ttaccagttc ggctttcaat 420  
ctaaaagaag ggcgacacct tcaaaaaggg gattccaaga aaatccttat ccacgaagaa 480  
ttggctaaga agaacggtct ttcgcttcat gacaagattg gcttgatgc tggtcagtct 540  
gaatctggaa aaggacaaac agtagagttt gagattatcg gcatcttttc tggtaaaaaa 600  
caagagaaat tcacaggctt gtcttctgac ttcagtgaag atcaagtctt tacagactat 660  
gaaagtagcc aaaccctttt gggcaatagt gaagctcaag tcagtgcagc acgcttctat 720  
gtagaaaatc ctaaggaaat ggacggactc atgaagcagg tagaaaactt ggccttggaa 780  
aatcaaggct accaagtcga aaaggaaaac aaggcttttg aacaaatcaa agactcagtt 840  
gcaactttcc aaacccttcc gaccatcttc ctttatggga tgttgatagc aggagctgga 900  
gccttaattc tggttttgtc tctctggttg agagaacggg tctatgaagt ggggatttta 960  
cttgcaattg gaaaaggcaa gagctcgatc ttcctacaat tctgtttaga ggtagttttg 1020  
gtatctcttg gagctttgct tccagcattt gttgcaggaa acgcaatcac aacttaccta 1080  
ctccaaactc tactagcaag tggagatcag gcaagcttac aagatacact agccaaagca 1140  
agcagtttat caactagcat cttatctttt gcagaatcct atgtttttct agttctgctt 1200  
agttgcttat ctgtagccct ttgtttccta ttcttattta gaaaatcacc gaaagaaatt 1260  
ttatcatcta ttagttaa 1278

<210> 22  
<211> 425  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 22  
Met Asn Pro Ile Gln Arg Ser Trp Ala Tyr Val Ser Arg Lys Arg Leu  
1 5 10 15

Arg	Ser	Phe	Ile	Leu	Phe	Leu	Ile	Leu	Leu	Val	Leu	Leu	Ala	Gly	Ile	20	25	30	
Ser	Ala	Cys	Leu	Thr	Leu	Met	Lys	Ser	Asn	Lys	Thr	Val	Glu	Ser	Asn	35	40	45	
Leu	Tyr	Lys	Ser	Leu	Asn	Thr	Ser	Phe	Ser	Ile	Lys	Lys	Ile	Glu	Asn	50	55	60	
Gly	Gln	Thr	Phe	Lys	Leu	Ser	Asp	Leu	Ala	Ser	Val	Ser	Lys	Ile	Lys	65	70	75	80
Gly	Leu	Glu	Asn	Val	Ser	Pro	Glu	Leu	Glu	Thr	Val	Ala	Lys	Leu	Lys	85	90	95	
Asp	Lys	Glu	Ala	Val	Thr	Gly	Glu	Gln	Ser	Val	Glu	Arg	Asp	Asp	Leu	100	105	110	
Ser	Ala	Ala	Asp	Asn	Asn	Leu	Val	Ser	Leu	Thr	Ala	Leu	Glu	Asp	Ser	115	120	125	
Ser	Lys	Asp	Val	Thr	Phe	Thr	Ser	Ser	Ala	Phe	Asn	Leu	Lys	Glu	Gly	130	135	140	
Arg	His	Leu	Gln	Lys	Gly	Asp	Ser	Lys	Lys	Ile	Leu	Ile	His	Glu	Glu	145	150	155	160
Leu	Ala	Lys	Lys	Asn	Gly	Leu	Ser	Leu	His	Asp	Lys	Ile	Gly	Leu	Asp	165	170	175	
Ala	Gly	Gln	Ser	Glu	Ser	Gly	Lys	Gly	Gln	Thr	Val	Glu	Phe	Glu	Ile	180	185	190	
Ile	Gly	Ile	Phe	Ser	Gly	Lys	Lys	Gln	Glu	Lys	Phe	Thr	Gly	Leu	Ser	195	200	205	
Ser	Asp	Phe	Ser	Glu	Asn	Gln	Val	Phe	Thr	Asp	Tyr	Glu	Ser	Ser	Gln	210	215	220	
Thr	Leu	Leu	Gly	Asn	Ser	Glu	Ala	Gln	Val	Ser	Ala	Ala	Arg	Phe	Tyr	225	230	235	240
Val	Glu	Asn	Pro	Lys	Glu	Met	Asp	Gly	Leu	Met	Lys	Gln	Val	Glu	Asn	245	250	255	
Leu	Ala	Leu	Glu	Asn	Gln	Gly	Tyr	Gln	Val	Glu	Lys	Glu	Asn	Lys	Ala	260	265	270	

Phe Glu Gln Ile Lys Asp Ser Val Ala Thr Phe Gln Thr Phe Leu Thr  
 275 280 285  
 Ile Phe Leu Tyr Gly Met Leu Ile Ala Gly Ala Gly Ala Leu Ile Leu  
 290 295 300  
 Val Leu Ser Leu Trp Leu Arg Glu Arg Val Tyr Glu Val Gly Ile Leu  
 305 310 315 320  
 Leu Ala Leu Gly Lys Gly Lys Ser Ser Ile Phe Leu Gln Phe Cys Leu  
 325 330 335  
 Glu Val Val Leu Val Ser Leu Gly Ala Leu Leu Pro Ala Phe Val Ala  
 340 345 350  
 Gly Asn Ala Ile Thr Thr Tyr Leu Leu Gln Thr Leu Leu Ala Ser Gly  
 355 360 365  
 Asp Gln Ala Ser Leu Gln Asp Thr Leu Ala Lys Ala Ser Ser Leu Ser  
 370 375 380  
 Thr Ser Ile Leu Ser Phe Ala Glu Ser Tyr Val Phe Leu Val Leu Leu  
 385 390 395 400  
 Ser Cys Leu Ser Val Ala Leu Cys Phe Leu Phe Leu Phe Arg Lys Ser  
 405 410 415  
 Pro Lys Glu Ile Leu Ser Ser Ile Ser  
 420 425

<210> 23

<211> 1407

<212> DNA

<213> Streptococcus pneumoniae

<400> 23

atgccgaacg gcacgtatgg tgggtgtgaga ggggctagag attatcccct actcgatatt 60  
 tttttttcgt atttcataaa tatttcatat ttgggtttta taatagtctt acaaatatgg 120  
 aggtgacaaa tgaatccaat ccaaagatct tgggcttatg tcagcagaaa gcgactgaga 180  
 agttttatatt tattttctgat tttattgggc ttattggccg gaatttcagc ctgtttgact 240  
 ctgatgaagt ccaacaaaac agtagaaagc aatctttata aatcactcaa tacatctttt 300  
 tctattaaga agatagagaa tggtcagaca ttcaagttgt cagacctagc atctgtaagc 360  
 aagattaagg ggctggaaaa tgtctctcct gaacttgaga cggtcgcaaa actaaaagac 420  
 aaggaagcag tgactggcga gcagagcgtg gagcgtgatg atttatcagc tgcagacaat 480  
 aacttggtta gcttaacggc tcttgaggat tcatccaagg atgtaacctt taccagttcg 540  
 gctttcaatc taaaagaagg gcgacacctt caaaaagggg attccaagaa aatccttatc 600  
 cacgaagaat tggctaagaa gaacggtctt tcgcttcatg acaagattgg cttggatgct 660

```

ggtcagtctg aatctggaaa aggacaaaca gtagagtttg agattatcgg catcttttct 720
ggtaaaaaaac aagagaaatt cacaggcttg tcttctgact tcagtgaaaa tcaagtcttt 780
acagactatg aaagtagcca aacccttttg ggcaatagtg aagctcaagt cagtgcagca 840
cgcttctatg tagaaaatcc taaggaaatg gacggactca tgaagcaggt agaaaacttg 900
gccttggaat atcaaggcta ccaagtcgaa aaggaaaaca aggcttttga acaaatcaaa 960
gactcagttg caactttcca aaccttcctg accatcttcc tttatgggat gttgatagca 1020
ggagctggag ccttaattct ggttttgtct ctctgggtga gagaacgggt ctatgaagtg 1080
gggattttac ttgcacttgg aaaaggcaag agctcgatct tcctacaatt ctgttttagag 1140
gtagtttttg tatctcttgg agctttgctt ccagcatttg ttgcaggaaa cgcaatcaca 1200
acttacctac tccaaactct actagcaagt ggagatcagg caagcttaca agatacacta 1260
gccaaagcaa gcagttttatc aactagcatc ttatcttttg cagaatccta tgtttttcta 1320
gttctgctta gttgcttata tgtagccctt tgtttcctat tcttatttag aaaatcacccg 1380
aaagaaattt tatcatctat tagttaa 1407

```

<210> 24

<211> 425

<212> PRT

<213> Streptococcus pneumoniae

<400> 24

```

Met Asn Pro Ile Gln Arg Ser Trp Ala Tyr Val Ser Arg Lys Arg Leu
  1             5             10             15

```

```

Arg Ser Phe Ile Leu Phe Leu Ile Leu Leu Val Leu Leu Ala Gly Ile
      20             25             30

```

```

Ser Ala Cys Leu Thr Leu Met Lys Ser Asn Lys Thr Val Glu Ser Asn
      35             40             45

```

```

Leu Tyr Lys Ser Leu Asn Thr Ser Phe Ser Ile Lys Lys Ile Glu Asn
      50             55             60

```

```

Gly Gln Thr Phe Lys Leu Ser Asp Leu Ala Ser Val Ser Lys Ile Lys
      65             70             75             80

```

```

Gly Leu Glu Asn Val Ser Pro Glu Leu Glu Thr Val Ala Lys Leu Lys
      85             90             95

```

```

Asp Lys Glu Ala Val Thr Gly Glu Gln Ser Val Glu Arg Asp Asp Leu
      100            105            110

```

```

Ser Ala Ala Asp Asn Asn Leu Val Ser Leu Thr Ala Leu Glu Asp Ser
      115            120            125

```

```

Ser Lys Asp Val Thr Phe Thr Ser Ser Ala Phe Asn Leu Lys Glu Gly
      130            135            140

```

```

Arg His Leu Gln Lys Gly Asp Ser Lys Lys Ile Leu Ile His Glu Glu

```

145		150		155		160									
Leu	Ala	Lys	Lys	Asn	Gly	Leu	Ser	Leu	His	Asp	Lys	Ile	Gly	Leu	Asp
				165					170					175	
Ala	Gly	Gln	Ser	Glu	Ser	Gly	Lys	Gly	Gln	Thr	Val	Glu	Phe	Glu	Ile
			180					185					190		
Ile	Gly	Ile	Phe	Ser	Gly	Lys	Lys	Gln	Glu	Lys	Phe	Thr	Gly	Leu	Ser
		195					200					205			
Ser	Asp	Phe	Ser	Glu	Asn	Gln	Val	Phe	Thr	Asp	Tyr	Glu	Ser	Ser	Gln
	210					215					220				
Thr	Leu	Leu	Gly	Asn	Ser	Glu	Ala	Gln	Val	Ser	Ala	Ala	Arg	Phe	Tyr
225					230					235					240
Val	Glu	Asn	Pro	Lys	Glu	Met	Asp	Gly	Leu	Met	Lys	Gln	Val	Glu	Asn
				245				250						255	
Leu	Ala	Leu	Glu	Asn	Gln	Gly	Tyr	Gln	Val	Glu	Lys	Glu	Asn	Lys	Ala
			260					265					270		
Phe	Glu	Gln	Ile	Lys	Asp	Ser	Val	Ala	Thr	Phe	Gln	Thr	Phe	Leu	Thr
		275						280				285			
Ile	Phe	Leu	Tyr	Gly	Met	Leu	Ile	Ala	Gly	Ala	Gly	Ala	Leu	Ile	Leu
	290					295					300				
Val	Leu	Ser	Leu	Trp	Leu	Arg	Glu	Arg	Val	Tyr	Glu	Val	Gly	Ile	Leu
305					310					315					320
Leu	Ala	Leu	Gly	Lys	Gly	Lys	Ser	Ser	Ile	Phe	Leu	Gln	Phe	Cys	Leu
				325					330					335	
Glu	Val	Val	Leu	Val	Ser	Leu	Gly	Ala	Leu	Leu	Pro	Ala	Phe	Val	Ala
			340					345					350		
Gly	Asn	Ala	Ile	Thr	Thr	Tyr	Leu	Leu	Gln	Thr	Leu	Leu	Ala	Ser	Gly
		355					360					365			
Asp	Gln	Ala	Ser	Leu	Gln	Asp	Thr	Leu	Ala	Lys	Ala	Ser	Ser	Leu	Ser
	370					375					380				
Thr	Ser	Ile	Leu	Ser	Phe	Ala	Glu	Ser	Tyr	Val	Phe	Leu	Val	Leu	Leu
385					390					395					400
Ser	Cys	Leu	Ser	Val	Ala	Leu	Cys	Phe	Leu	Phe	Leu	Phe	Arg	Lys	Ser



Pro Lys Glu Ile Leu Ser Ser Ile Ser  
420 425

<210> 25

<211> 8900

<212> DNA

<213> Streptococcus pneumoniae

<400> 25

```

gataagtttg tagcagctat ggatgaagat tttaatgctg ccaacggtat cacagttgtc 60
tttgaaatgg ccaaattggat caactcaggg aactatgatg caagtgtcaa gcaagctctt 120
gcagatatgt tagaaatfff tggaattgtc tttgttgagg aagttttgga tgcagagatt 180
gaagacttga ttcaaaaacg ccaagaggcg cgtgccaatc gtgactttgc gacagcagac 240
caaatccgtg accaattggg tactcaagga attaagctcc ttgataccaa ggatggagtg 300
aggtggacac gtgattgatg tcaatctcat taacgggatt gcgctagcct ttgaggggga 360
tgcggtgtat tctatgtata ttgcgcgtca cctcatcctc aaaggtatga ccaaacccaa 420
taaactccat caagaagcaa ctaagtacgt gtcagccaag gctcaggctc gcctgattgc 480
tctcatgttg gaggagcagg tcctaacgga aaaagaagaa gaaatctaca aacgtggccg 540
caataccaat agccacacaa aggctaaaaa tgcagatgtc gtgacttata gtatgtccac 600
gggatttgaa gcggttatgg gctatctcca tatgactgag aatctggaac gtcttgagag 660
tttggtttca tgggtgcatcc aaaaagtggg gggctagaac atgagggcaa aagaactaca 720
agactggttt cctgaggctc ggatttcaga ccaaccagta gagaaagagg gctatctcac 780
gctcccttta gcttctcagc agtggatttt gctggaggaa gctgggctca gcgagcgtga 840
aaagcagttg gttgcccttt tgacccagca ggagcaggct cgttcgctaa acccttggtg 900
ttcctatctg gttgagggca agggacaggc accgcaagtt tttaaaaaga ttcagttggt 960
ttattgccat ctttcttatt ttcagcagga aaatctggct tcttggttag atatgatgcg 1020
gactcttttt ccgaattgtc agacagtgtc acaggtcgga gctcaggatt atgttttctg 1080
gcttcaacaa gacaaatata cttctgtaag agatatttta agtgatacga ttgaagcggg 1140
tgagtatgac tttggacttc gtctttctat catgttgggt caggtttggt ctgagacggg 1200
acatcaagcc ctatcagact taatcaaagc tgagcgggat ttgttcaaga catggtggcg 1260
tcagggtcac caaggtgttc atactttttc tcagctctat ctttgagta tgggagaaaag 1320
actcgtggac ttgaagccaa tcaaggaatg tctacaccag atgatttttg atcaagatca 1380
gattcaggaa atcattctct ctctttggga aaatagtgtc gttctcacta aaacagccca 1440
gcaactctat ctgcaccgca attctctcca atacaagatt gataaatggg aagagttgac 1500
agggtctcag ttgaaagagt tgaccgacct gaccttgtgt tatcaattga ttttaggttc 1560
tttgtcaact atagttgggt tgtaaagaag ttaatatgtg gagaagagga ttgccatctt 1620
ctccattttt atgtgcagag ttatagtggc ttgatgctgg gaaagtacac tgtgactgct 1680
aaaacattcc tagaagctgc tttgatttcc ctaatctatt tatgcaaatt ttatgttatt 1740
ttactataac agttgttgct aagccaaata atagtgggga agttcattta gacgtaagca 1800
ttgaagataa tcaggagggt agtgggtata atttcagttc tgtttcaagt agctcacaaa 1860
cagctaaata tgaaggaact gtttataata acaattcatc attatatata acgattgata 1920
aaacgtctga tgcaacagct cttttgaaat taaagttgaa taatgttgat aatcaacctg 1980
ctactgaagt tcctagtcca ggaattactg taaaattaaa tgctaaagat aatgctggaa 2040
actggacaag tgcttcgaat aaaaaagaag taacagtaaa aattgtttct gctaaaccga 2100
catatccaga caaatctta gtgaaaaatc ctgataatat aaaagatata gaaaaaatgc 2160

```

cattattgaa	aaattgaaag	aggcaaataa	aaatcatcca	gcaggagctc	caacctttgc	2220
taaaggtgaa	ggagagcatg	caaatagat	tgtagcaact	tattcagatg	gtacaactta	2280
ttatgtaccg	ttaaatgatg	tgacaaaata	tgcgaggtag	tggtgtacc	actcacttat	2340
tcacctcccc	gtgatttgta	gtagtgatag	gttttctcac	tattattata	aaacaaaata	2400
aagatcacaa	cactttttca	ttctgtgttg	tgcccttgagt	gaaacgaaag	gaatgaatta	2460
taaatatgaa	aagtatatgc	actagcatag	atgagcgctt	gcgtactcgc	ctacgagtga	2520
ttatctggaa	gcaatggaag	aagaaatcga	gacgattatg	gggattgctt	aagttagggg	2580
ttcctaaatg	gatagcagat	aaggtatctg	gctggggcga	ccactatcaa	ttatagtaaa	2640
atgaaataag	aataggacga	attgttcagg	acagtcaa	cgatttctaa	caatatttta	2700
gaagtagagg	tgtactattc	tagtttcaat	ctactatagt	agctcagaag	tcggtactta	2760
aacgtgctat	atcaaaacca	gtcccttgaaa	aacgtggact	ggtttcgtgt	ttggattatt	2820
accttgaacg	acatgcgtta	aaagttagtt	gaaccgccgt	atgccgaacg	gcacgtatgg	2880
tggtgtgaga	ggggctagag	attatcccc	actcgatatt	tttttttcgt	atttcataaa	2940
tatttcatat	ttgggtttta	taatagtctt	acaaatatgg	aggtgacaaa	tgaatccaat	3000
ccaaagatct	tggtgcttatg	tcagcagaaa	gcgactgaga	agttttatatt	tatttctgat	3060
tttattgggtc	ttattggccg	gaatttcagc	ctgtttgact	ctgatgaagt	ccaacaaaac	3120
agtagaaagc	aatctttata	aatcactcaa	tacatctttt	tctattaaga	agatagagaa	3180
tggtcagaca	ttcaagttgt	cagacctagc	atctgtaagc	aagattaagg	ggctggaaaa	3240
tgtctctcct	gaacttgaga	cggtcgcaaa	actaaaagac	aaggaagcag	tgactggcga	3300
gcagagcgtg	gagcgtgatg	atattatcagc	tgacagacaat	aacttggtta	gcttaacggc	3360
tcttgaggat	tcacccaagg	atgtaacctt	taccagttcg	gctttcaatc	taaaagaagg	3420
gcgacacctt	caaaaagggg	attccaagaa	aatccttatc	cacgaagaat	tggttaagaa	3480
gaacggtctt	tcgcttcattg	acaagattgg	cttggtatgct	ggtcagtcctg	aatctggaaa	3540
aggacaaaca	gtagagtttg	agattatcgg	catcttttct	ggtaaaaaac	aagagaaatt	3600
cacaggcttg	tcttctgact	tcagtgaaaa	tcaagtcttt	acagactatg	aaagtagcca	3660
aacctttttg	ggcaatagtg	aagctcaagt	cagtcagca	cgcttctatg	tagaaaatcc	3720
taaggaaatg	gacggactca	tgaagcaggt	agaaaacttg	gccttgga	atcaaggcta	3780
ccaagtcgaa	aaggaaaaca	aggcttttga	acaaatcaaa	gactcagttg	caactttcca	3840
aaccttcctg	accatcttcc	tttatgggat	gttgatagca	ggagctggag	ccttaattct	3900
ggttttgtct	ctctggttga	gagaacgggt	ctatgaagtg	gggattttac	ttgcacttgg	3960
aaaaggcaag	agctcgatct	tcctacaatt	ctgttttagag	gtagtttttg	tatctcttgg	4020
agctttgctt	ccagcatttg	ttgcaggaaa	cgcaatcaca	acttacctac	tccaaactct	4080
actagcaagt	ggagatcagg	caagcttaca	agatacacta	gccaaagcaa	gcagtttatc	4140
aactagcatc	ttatcttttg	cagaatccta	tgtttttcta	gttctgctta	gttgcttatc	4200
tgtagccctt	tgtttcctat	tcttatttag	aaaatcacccg	aaagaaattt	tatcatctat	4260
tagttaagaa	ggagaaatca	tgactttatt	acaattacaa	gatgttacct	accgttataa	4320
gaatactgct	gaagcagtc	tatatcagat	caattataat	tttgaaccgg	gaaaatttta	4380
cagtattatt	ggggagtcag	gagcaggaaa	atccacactc	ttgtccctac	ttgctggctt	4440
agatagtcct	gttgaagggt	ctatcccttt	tcaaggagag	gatattcgta	agaagggcta	4500
ttcttaccat	cgcatgcacc	atatttccct	ggtctttcaa	aattataact	tgatagatta	4560
tctttctccg	ctggaaaata	tccgattgg	caacaaaaag	gcaagcaaga	atacacttct	4620
tgagcttggt	ttggatgaaa	gccagatcaa	gcggaatgtt	ctccagttat	caggtgggtca	4680
acagcaacgt	gttgccattg	ctcgcagttt	ggtctcagaa	gctccagtta	ttctagctga	4740
tgagccaaca	ggaaatctgg	atcctaaaac	tgctggagat	attgtcgaac	tactcaaatac	4800
acttgcccag	aaaacaggta	aatgtgtgat	tgctgtaact	cacagtaaag	aagtggcaca	4860
agcgtcagat	attacacttg	aattaaagga	taagaaactg	actgaaacgc	gcaatactag	4920
taaataattt	gagcttattt	taatagaatg	attaaaacaa	aatctagaaa	gggaatctat	4980
gttacacaac	gcatttgcct	atgttacaag	gaagtttttc	aaatcgattg	tcaccttcct	5040

gattattctc	ctcatggcga	gcttgagttt	ggtcggcttg	tcaatcaagg	gagctactgc	5100
caaggcttct	caggagacct	ttaaaaatat	caccaatagc	ttctccatgc	aaatcaatcg	5160
tcgcgtcaac	caaggaacgc	ctcgtggtgc	tgggaatatc	aagggtgaag	acatcaaaaa	5220
aatcaccgaa	aacaaggcca	ttgagtcctt	tgtcaaacgt	atcaacgcta	tcggagattt	5280
gactggatat	gacctgattg	aaacgccaga	aaccaagaag	aatctcactg	ctgatcgtgc	5340
caagcgtttt	ggaagtagct	tgatgattac	aggtgtcaat	gactcctcta	aagaagacaa	5400
gtttgtctct	ggttcttata	aactagtcga	aggagagcac	ttaaccaacg	acgacaagga	5460
taaaatcctc	ttgcacaagg	acttggcagc	caaacacggc	tggaaagtag	gggacaaggt	5520
taaactggac	tctaatatct	acgatgcaga	taatgaaaaa	ggagccaagg	aaacagttga	5580
agtgacaatc	aagggactct	ttgatgggtc	taataagtca	gcagtaacct	actcacaaga	5640
actttacgaa	aacacagcta	ttacagacat	tcacactgct	gcaaaacttt	atggatacac	5700
agaagacaca	gccatttatg	gggacgcaac	cttctttgta	acagcagaca	agaacttgga	5760
tgatgttatg	aaagagttga	atggcatcag	tggtatcaac	tggagagct	acacactcgt	5820
caagagctcc	tctaactacc	cagctcttga	gcaatctatc	tctggtatgt	acaagatggc	5880
caacctcctc	ttctggggta	gcttgagctt	ctcagttctc	ctccttgccc	tcttgctcag	5940
cctttggatc	aacgcccgtc	gcaaggaagt	gggaattctc	ctctctatcg	gcctcaagca	6000
ggcaagtatc	ttgggtcaat	tcatcaccca	atctatcttg	attgctatcc	ctgctctagt	6060
ttctgcttac	ttcctagcta	attacactgc	ccgtgcaatt	ggaaacactg	tccttgccaa	6120
tgtgacttca	ggtgttgcca	aacaggctag	taaggcggct	caagcctcta	accttgggtg	6180
tggtgcagaa	gtagatggct	ttagcaagac	cttgtcgcgc	ctagacattt	ccattcagac	6240
atcagacttt	atcatcattt	ttgtccttgc	cttggttcta	gtggttctcg	ttatggcgct	6300
tgcttcaagc	aatctcctta	gaaaacaacc	aaaagagctc	ttgctggatg	gtgaataaat	6360
ttgaaaaaat	gagtctagaa	taaagattgc	atcttgtggt	tctattcaag	aatagtggat	6420
aggaatggct	atttaacaat	tcaaaaataa	tccgaaagca	gtggtgaaaa	tcattgcttt	6480
cagttgcttt	ctttgtactt	tagtgcttaa	atataatata	ctaaagttat	ggaatttatg	6540
agaaaggaat	ttcacaacgt	tttatctagt	ggtcagttgc	ttgcagacaa	aaggccagca	6600
agagactata	atagaaaata	gggtaggtat	ttattctaag	aaaaataaaa	aatagagagc	6660
agttaaagta	tgaaaatttt	aattgtagaa	gatgaagaga	tgatccgtga	gggggtcagt	6720
gattatttga	cggattgtgg	ctatgaaact	attgaggcag	cggacggtca	ggaagctctg	6780
gagcaatttt	ctagctatga	ggtggccctg	gttttactgg	atatccagat	gcccagctc	6840
aacggcttag	aagtcctagc	tgagattcgt	aaaaccagtc	aggttcctgt	cttgatggtg	6900
acagcttttc	aagatgagga	atacaagatg	agtgcctttg	cctctttggc	agatggctat	6960
ctggaaaaac	ctttctccct	ctccctttta	aaagtgaggg	tggacgcgat	tttcaagcgc	7020
tactacgata	caggacgaat	cttttcttac	aaggatacca	aggtggactt	tgaaagctac	7080
agtgaagcc	tcgcaggtca	agaagtgcct	atcaatgcca	aagagttgga	aattctggac	7140
tatctagtga	aaaatgaagg	cggggccttg	actcgatctc	agattatcga	tgccgtctgg	7200
aaagcgacag	atgaggttcc	ctttgaccgt	gttattgatg	tttatatcaa	ggaattgcgg	7260
aaaaagctag	acttggaattg	tatcctcact	gtgcgcaatg	ttggttataa	attggagcga	7320
aaatgaaacg	aacaggttta	tttgcaaaaga	tatttatcta	taccttctcg	atatttagtg	7380
ttctggttat	ctgccttcat	ttagctattt	attttctttt	tccttcgact	tatctgagtc	7440
atcgtcagga	aaccattggt	caaaaggcaa	cagccattgc	ccagtcctta	gaagggaaag	7500
ataggcagag	tatcgagcaa	gtgttagact	tgtattccca	gactagtgat	atcaagggga	7560
ccgtcaaagg	tgagatgacc	gaggacaagt	tagaagtcaa	ggacagtctt	cctctggaca	7620
cagaccgcca	gacaacctct	ctctttattg	aggagcgcga	ggtgaaaacg	caagacggtg	7680
gtactatgat	tctccagttt	ctagcttcca	tggatttaca	aaaggaagcg	gagcaaatca	7740
gtctccagtt	tcttccctat	acettgctgg	cctcctttct	gatttccctt	ttggtggcct	7800
acatctacgc	tcggactatt	gttgcaaccga	ttttggaaat	caagcgggtg	acccgtcgga	7860
tgatggacct	ggattcccaa	gtgcgattgc	gcgtggattc	taaggatgag	ataggtaatc	7920

```

tcaaggaaca aatcaatagc ctctaccagc atctcttgac tgttattgcg gacttgcattg 7980
aaaagaatga agccattctc cagctggaga agatgaaggt cgaattccta cgaggagctt 8040
ctcatgaatt gaaaacaccg ctggctagtt tgaaaatcct aatcgaaaat atgagagaga 8100
atatcggtcg ttataaggat agagaccagt atctgggagt tgccttgggg attgtggatg 8160
aactcaatca ccatgttctg cagatacttt ccctctcttc tgtgcaggaa ttgcgagatg 8220
atagggaac aattgacctc ctccagatga cgcaaaatct ggtcaaagat tatgccttgc 8280
tagccaagga aagagagctc cagatagaca atagtgtgac ccatcagcag gcttatctaa 8340
acccatcagt tatgaagttg attctttcta atctcatcag caatgccatt aagcactctg 8400
ttccaggtgg cttagtctga attggagaaa gagaaggaga actttttatc gaaaatagct 8460
gtagctcaga ggaacaagaa aaactagccc agtctttttc tgacaatgcc agtcgcaagg 8520
tcaaggggtc tggtagggg ctctttgtgg ttaagagtct attagaacat gaaaaattag 8580
cttatcgttt cgagatggag gagaatagtt taaccttctt tatagatttt ccaaaagtcg 8640
tccaagacta gggagagaaa gggttttacat agatggagtt agaagaaaat caatcgaaac 8700
tgcgggaaaa actagatttt tttggcaaaa agtgataaaa tgaacaatgt aaatgggatg 8760
accataaaaa atatacagga ggcctgataa aatggcaatc gtttcagcag aaaaatttgt 8820
ccaagcagcc cgtgacaacg gttatgcagt tggtggattt aacacaaaca accttgagtg 8880
gactcaagct atcttgcgcg                                     8900

```

<210> 26

<211> 25

<212> PRT

<213> *Methanococcus jannaschii*

<400> 26

```

Asn Arg Lys Val Phe Ile Val Val Leu Ser Met Leu Leu Leu Leu Ala
  1                   5                   10                   15

```

```

Met Glu Arg Pro Trp Cys Ser Leu Val
                20                   25

```

<210> 27

<211> 25

<212> PRT

<213> *Haemophilus influenzae*

<400> 27

```

Ser Ser Leu Leu Asp Gly Val Lys Ile Ala Ser Gly Asn Leu Leu Ala
  1                   5                   10                   15

```

```

Ser Thr Lys Pro Ser Gly Asn Phe Asn
                20                   25

```

<210> 28

<211> 25

<212> PRT

<213> *Haemophilus influenzae*

<400> 28

Ser Arg Lys Arg Phe His Gln Ile Leu Met Gln Gly Met Lys Leu Ala  
1 5 10 15

Tyr Arg Ile Tyr Arg Ser Ser His Asp  
20 25

<210> 29

<211> 25

<212> PRT

<213> Haemophilus influenzae

<400> 29

Arg Ser Asp Lys Phe His Ser Thr Ile Val Leu Ser Ser Val Leu Ala  
1 5 10 15

Asp Lys Lys Thr Pro Arg Cys Cys His  
20 25

<210> 30

<211> 25

<212> PRT

<213> Archaeoglobus fulgidus

<400> 30

His Val Glu Glu Leu His His Val Val Glu Ser Leu Ala Leu Leu Ser  
1 5 10 15

Asp Lys Val Leu Cys Arg Asn Ser Tyr  
20 25

<210> 31

<211> 25

<212> PRT

<213> Archaeoglobus fulgidus

<400> 31

Thr Gly Arg Glu Ala Arg Arg Ile Ile Ser Ala Gly Glu Ile Leu Val  
1 5 10 15

Asp Gly Val Val Arg Lys Asp Tyr Lys  
20 25

<210> 32  
<211> 25  
<212> PRT  
<213> Archaeoglobus fulgidus

<400> 32  
Arg Cys Leu Arg Arg Asp Ser Leu Phe Ser Ser Gly Cys Leu Leu Ala  
1 5 10 15  
Gly Glu Glu Pro Ser Arg Arg Ser Cys  
20 25

<210> 33  
<211> 25  
<212> PRT  
<213> Borrelia burgdorferi

<400> 33  
Val Leu Arg Thr His Gly Thr Val Leu Ser Ala Lys Gln Leu Ile Asn  
1 5 10 15  
Ala Lys Asn Pro Ser Arg Tyr Phe Gly  
20 25

<210> 34  
<211> 20  
<212> PRT  
<213> Synechocystis sp.

<400> 34  
Leu Lys Glu Glu Phe Glu Lys Phe Arg Ser Ala Gly Glu Lys Leu Leu  
1 5 10 15  
Asp Phe Arg Pro  
20

<210> 35  
<211> 12  
<212> PRT  
<213> Synechocystis sp.

<400> 35  
Phe Gly Asn Gln Leu Ser Ile Gly Gln Leu Ile Ala  
1 5 10

<210> 36  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Modified  
Streptococcus Pneumonia peptide

<220>  
<221> VARIANT  
<222> (24)  
<223> It can be any amino acid at this position.

<400> 36  
Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu Leu Ala  
1 5 10 15  
Asp Lys Arg Pro Ala Arg Asp Xaa Asn  
20 25

<210> 37  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Primer

<400> 37  
aatgagtcta gaataaagat tgc 23

<210> 38  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Primer

<400> 38  
tcttagaata aatacctacc c 21

<210> 39  
<211> 23  
<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Modified  
Streptococcus Pneumonia peptide

<220>

<221> VARIANT

<222> (6)..(11)

<223> They can be any amino acid.

<220>

<221> VARIANT

<222> (15)

<223> It can be any amino acid.

<220>

<221> VARIANT

<222> (20)

<223> It can be any amino acid.

<400> 39

Arg Lys Glu Phe His Xaa Xaa Xaa Xaa Xaa Xaa Gln Leu Leu Xaa Asp  
1 5 10 15

Lys Arg Pro Xaa Arg Asp Tyr  
20

<210> 40

<211> 8

<212> PRT

<213> Streptococcus pneumoniae

<400> 40

Asp Lys Arg Pro Ala Arg Asp Tyr  
1 5

<210> 41

<211> 7

<212> PRT

<213> Streptococcus pneumoniae

<400> 41

Arg Lys Glu Phe His Asn Val  
1 5



<210> 42  
<211> 7  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 42  
Leu Ser Ser Gly Gln Leu Leu  
1 5

<210> 43  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Modified  
Streptococcus Pneumonia peptide

<220>  
<221> VARIANT  
<222> (2)..(6)  
<223> They can be any amino acid.

<220>  
<221> VARIANT  
<222> (11)  
<223> It can be any amino acid.

<220>  
<221> VARIANT  
<222> (13)..(15)  
<223> They can be any amino acid.

<220>  
<221> VARIANT  
<222> (17)..(20)  
<223> They can be any amino acid.

<220>  
<221> VARIANT  
<222> (22)..(24)  
<223> They can be any amino acid.

<400> 43  
Met Xaa Xaa Xaa Xaa Xaa Asn Val Leu Ser Xaa Gly Xaa Xaa Xaa Ala  
1 5 10 15

Xaa Xaa Xaa Xaa Ala Xaa Xaa Xaa Asn  
20 25

<210> 44  
<211> 27  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 44  
Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu Leu Ala  
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Tyr Asn Arg Lys  
20 25

<210> 45  
<211> 312  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 45  
aatttgaaaa aatgagtcta gaataaagat tgcattctgt gtttctattc aagaatagtg 60  
gataggaatg gctatttaac aattcaaaat aaatccgaaa gcagtgggtga aaatcattgc 120  
tttcagttgc tttctttgta ctttagtgct taaatataat atactaaagt tatggaattt 180  
atgagaaaagg aatttcacaa cgttttatct agtggtcagt tgcttgcaga caaaaggcca 240  
gcaagagact ataatagaaa atagggtagg tatttattct aagaaaaata aaaaatagag 300  
agcagttaaa gt 312

<210> 46  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Primer

<400> 46  
aatgagtcta gaataaagat tgc 23

<210> 47  
<211> 27  
<212> PRT  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Modified  
Streptococcus Pneumonia peptide

<400> 47

Met Arg Lys Glu Phe His Asn Val Leu Ser Ala Gly Gln Leu Leu Ala  
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Tyr Asn Arg Lys  
20 25

<210> 48

<211> 30

<212> PRT

<213> Streptococcus pneumoniae

<400> 48

Met Glu Phe Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln  
1 5 10 15

Leu Leu Ala Asp Lys Arg Pro Ala Arg Asp Tyr Asn Arg Lys  
20 25 30

<210> 49

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 49

acgaagaatt cgctaagaag aacggt 26

<210> 50

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 50

attaaggatc cagctatcaa 20

<210> 51

<211> 23

<212> DNA  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 51

atcaagggat ccactgcaa ggc

23

<210> 52

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 52

agaggagaat tcccacttcc ttgcg

25

<210> 53

<211> 81

<212> DNA

<213> Streptococcus pneumoniae

<400> 53

atgagaaagg aatttcacaa cgttttatct agtggtcagt tgcttcgaga caaaaggcca 60  
gcaagagact ataatagaaa a 81

<210> 54

<211> 90

<212> DNA

<213> Streptococcus pneumoniae

<400> 54

atggaattta tgagaaagga atttcacaac gttttatcta gtggtcagtt gcttcgagac 60  
aaaaggccag caagagacta taatagaaaa 90